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THE LOAD-LINES OF SHIPS

THE regulation of the depth of loading of ships is a matter that has received the attention of scientific men and practical seamen during many years. It has been hotly discussed in various quarters, and numerous disputes have arisen over the attempts of the Board of Trade to carry their views respecting it into practice. A long series of debates and disputes culminated in the appointment of a Committee by Mr. Chamberlain, the late President of the Board of Trade, to report upon the question.

That Committee, now well known as the late Load-line Committee, had Sir E. J. Reed, K.C.B., M.P., for its Chairman, and reported to the President of the Board of Trade in August last. The Report was unanimous; and was conclusive as to the practicability of framing general rules concerning freeboard which will prevent dangerous overloading without unduly interfering with trade. The Committee's rules have been accepted by the Board of Trade and Lloyd's Register Society; and at the same time they have received the general approval of ship-owners.

Like many answers that are given to questions, the Committee's Report states the opinions that were arrived at, but does not give the reasons for them. This natural omission has been supplied by a paper read before the Society of Arts on the 11th inst., by Prof. Elgar, of Glasgow University, who was a member of the Committee. Prof. Elgar said:—

"It is necessary to understand the causes of the differences between the various types of vessels. It must be obvious that no simple rule of a given number of inches per foot of depth of hold, can now be applied with equal fairness to all vessels alike. Each requires to be judged of separately, and to have its special characteristics adequately appreciated. The problem of framing a general scheme for regulating the freeboards of the principal types of ships involves, firstly, the consideration of how freeboards should vary in vessels belonging to any given type, according to size, proportions, and form; and, secondly, the consideration of how the freeboards of vessels of similar sizes, proportions, and forms, but of different types, should be regulated relatively to each other."

He went on to show how the elements of size and relative proportions are dealt with in the Committee's tables, and also how form is taken into consideration by means of approximate coefficients of fineness.

The effects of differences in sheer and round of beam are separately investigated, and also the influence of deck-erections—such as forecastles, poops, midship houses, and others—upon seaworthiness. The whole question of allowances for deck-erections of various kinds is one which cannot be brought within the scope of exact different treatment; and it is a point upon which the Committee appear to have been guided more by the opinions of seamen and by the recorded experience of successful ship-owners than by any other considerations.

Among the chief scientific questions connected with the safe loading of ships are those of structural strength and stability. Prof. Elgar describes as follows the manner in which these have been treated by the Load-line Committee:—

"Flush-decked steamers of the 100 A class in Lloyd's Register, which are of full strength to the upper deck, are, it is known, amply strong enough to bear loading to the freeboards given in the tables. Spar and awning deck-vessels, which are of less strength, may become unseaworthy through excessive straining action at sea if loaded to the same depths as the vessels above-named. And there are instances of vessels of those types having been severely strained at sea, and of some which have probably foundered in consequence, when loaded unduly deep. The principle which the Committee has adopted in dealing with these and other vessels that are inferior in strength to those of the 100 A class of full scantling ships in Lloyd's Register, is to fix approximately the limits at which the stress upon the material of the hull shall not exceed that of the stronger class of the same proportions, form, and moulded depth, when loaded to the freeboard required by the tables. In our present state of knowledge of how to calculate exactly the relative stresses upon the materials of ship's hulls, it is impossible to rely upon absolute accuracy of comparison, but the principle is a sound one. It can be applied with a fair degree of accuracy in many cases, and it is only to be expected that the present deficiencies in this branch of science will be made good in time. In thus adopting Lloyd's 100 A class as a standard of strength, the Committee must not be supposed to indorse Lloyd's Rules in any sense. They are merely taken by the Committee as being the best, or, indeed, the only recognised standard we now have.

"The question of stability is one that has often been raised in connection with the regulation of freeboards. Stability is, however, so intimately associated with stowage that it is only possible to deal with it by defining how ships of various proportions and types are to be stowed. The Load-line Committee did not feel called upon to deal with an independent problem of such magnitude and such great complexity as this. Stability need not ordinarily enter into the determination of the load-line, except for the purpose of insuring to ships of great proportionate depth the necessary stability at sea when employed in the carriage of grain, or other cargoes that are approximately homogeneous. If properly qualified persons are intrusted with the assignment of load-lines, they will readily distinguish between vessels in which stability is likely to be a question of importance and those in which it is not. In cases where vessels will obviously admit of being loaded so as to become unstable at sea, the owners should be looked to for particulars of the stability, and for furnishing proof that, so far as stability is concerned, the vessel may be safely laden with her intended cargoes to the load line given in the tables, or to such a reduced draught as may be considered proper. The responsibility of providing stability, or of showing that sufficient is provided, must be left with ship-owners. Stability is regulated by stowage; and no mere provision of freeboard, height of platform, or strength of structure, can make a ship safe if her stability is not secured by proper stowage. The regulation of stowage has but little more to do with freeboard tables than has the regulation of steam-power, bulkhead division,

manning, and other essential elements of safety. Each of these points requires to be separately and fully dealt with."

Great importance is rightly attached by the Load-line Committee to the administration of the freeboard tables. The most perfect tables that can be framed must necessarily be incomplete in many particulars, and must leave much to the discretion of those who have to use them. The mere tables only apply to existing types of vessels; and out of those existing types they can only apply to vessels of high class which are in good condition. In the administration of the tables great discretion and knowledge are necessary, in order to use them with reasonable modifications, in view of changes in the types of ships, or of improvements in ships, that the continuous progress of naval architecture is certain before long to cause. The same discretion and knowledge are necessary in dealing with vessels which, by reason of age, structural defects, more or less rapid deterioration, or of anything that may be observed in their condition, cannot safely or fairly be loaded as deeply as vessels which are in first-class condition. The great majority of the members of the Committee are of opinion that, in order to give useful and satisfactory effect to the tables, the scientific staff of the Board of Trade should be strengthened, and should be made capable of dealing with all questions of such a nature that may arise, in a manner likely to command the confidence of ship-owners and of the public. They also think it essential that this work should be done under the superintendence of a representative body, which should consist not only of officials but also of ship-owners, naval architects, seamen, and perhaps underwriters.

Sir E. J. Reed said, "The Load-line Committee, in the inquiry which they undertook, had a very difficult task to perform. The origin of that Committee was this: the Legislature having placed the obligation of stopping the overloading of ships on the Board of Trade, that Department tried to do so, but failed to succeed, their interference being resisted by ship-owners. Thereupon Mr. Chamberlain conceived the idea of forming a Committee of gentlemen for the purpose of thoroughly investigating the subject, and seeing what answers could be given to the questions which had been referred to in the paper. The best proof that the Committee had done its work with a fair measure of success was to be found in the fact that no one had that evening complained of the results at which they arrived, which would not have been the case had mistakes been committed, as ship-owners never hesitated to defend themselves. Prof. Elgar had shown how necessary it was to supplement the labours of the Committee by further knowledge and investigation touching other elements of the safety of ships at sea. He believed ship-owners came out exceedingly well in the inquiry, both in the evidence they laid before the Committee and in the manner in which they applied their knowledge and experience to the investigation; and he should feel it his duty, when he saw Mr. Chamberlain, to point out to him that nothing could have been more fair-minded, more open or thorough, than the manner in which they co-operated with the other members of the Committee in bringing about the result which had been attained."

The public are indebted to the Load-line Committee for the satisfactory manner in which they performed a most difficult task; and especially to the Chairman, Sir E. J. Reed, to whose ability and good judgment the success of their labours may very largely be attributed.

THE WANDERINGS OF PLANTS AND ANIMALS

The Wanderings of Plants and Animals from their First Home. By Victor Hehn. Edited by James Steven Stallybrass. (London: Swan Sonnenschein and Co., 1885.)

THE title of this book is somewhat misleading, since it treats only of domesticated animals and cultivated plants, and of these solely in relation to European civilisation. The subject is treated as almost entirely a philological one, the origin of the several species and varieties being deduced from a study of their names in different countries and from a critical examination of the earliest references to them in ancient writers. The author's point of view is thus clearly stated in the preface:—

"The purely scientific man will judge chiefly by the suitability of soil and climate. If he finds a plant flourishing pretty abundantly in Greece or Italy now, and knows of no climatic or geologic changes that would exclude its having flourished there 5000 years ago, he will at once pronounce it indigenous, and scout the notion of its having been imported. But now listen to the scholar, and he may tell you that Homer never mentions such a plant; that later poets speak of it in a vague way as something very choice and very holy, and always in connection with some particular deity: they may have tasted its fruit, may have seen the figure of its flowers (probably conventional) in emblematic painting or carving, but have not the faintest notion of its shape or size, whether it be a grass, a shrub, or a tree; till at last, in the time of Darius or Alexander, the plant itself emerges into clear visibility. Your inference will be that it came to Greece within historic times."

In this way he claims to have shown "that the flora of Southern Europe has been revolutionised under the hand of man; that the evergreen vegetation of Italy and Greece is not indigenous, but is mainly due to the sacred groves planted round the temples of Oriental gods and goddesses; that in this way the laurel has followed the worship of Apollo, the cypress and myrtle that of Aphrodite, the olive that of Athena, and so on." But this very wide statement seems hardly to be justified by the evidence adduced in this volume.

As a good example of our author's mode of treatment we may refer to his account of the domestic cat. This animal, he shows, was quite unknown to the Greeks and Romans of the classical age. In the Batrachomyomachia the mouse tells the frog that he fears above all things the hawk and the weasel, but most the weasel, because it creeps after him into his holes. In "The Wasps" of Aristophanes a domestic story begins: "Once upon a time there was a mouse and a weasel"—just as we say to children, "There was once a cat and a mouse." In the fable of the City mouse and the Country mouse as related by Horace, the latter is frightened, not by a cat, but by the barking of dogs. In the original fables of Æsop, of Babrius, and of Phædrus, the cat is never mentioned, the weasel always occupying the place the former animal